***INFORMATION TECHNOLOGY***



***CMR TECHNICAL CAMPUS***

**(Affiliated to J.N.T.U, HYDERABAD)**

Kandlakoya(v),Medchal -501 401

**COURSE FILE**

Subject: ***DISTRIBUTED SYSTEMS***

Year: **III– Batch, II SEM** Branch:**IT**

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1. **Department vision & mission**

**Vision**

* To produce globally competent and industry ready graduates in Computer Science & Engineering by imparting quality education with a know-how of cutting edge technology and holistic personality

**Mission**

* To offer high quality education in Computer Science & Engineering in order to build core competence for the graduates by laying solid foundation in Applied Mathematics, and program framework with a focus on concept building
* The department promotes excellence in teaching, research, and collaborative activities to prepare graduates for professional career or higher studies
* Creating intellectual environment for developing logical skills and problem solving strategies, thus to develop, able and proficient computer engineer to compete in the current global scenario

**2.1 Program Educational outcome (PEO):**

* Excel in professional career or higher education by acquiring knowledge in mathematical, computing and engineering principles
* To provide intellectual environment for analyzing and designing computing systems for technical needs
* Exhibit professionalism, multidisciplinary teamwork and adapt to current trends by engaging in lifelong learning and practice their profession with legal, social and ethical responsibilities

**2.2 Program Outcome (PO):**

1. **Engineering knowledge:** An ability to apply knowledge of computing, mathematics, science and engineering fundamentals appropriate to the discipline
2. **Problem analysis:** An ability to analyze a problem, and identify and formulate the computing requirements appropriate to its solution
3. **Design/development of solutions:** An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations
4. **Conduct investigations of complex problems:** An ability to design and conduct experiments, as well as to analyze and interpret data
5. **Modern tool usage:** An ability to use current techniques, skills, and modern tools necessary for computing practice
6. **The engineer and society:** An ability to analyze the local and global impact of computing on individuals, organizations, and society
7. **Environment and sustainability:** Knowledge of contemporary issues
8. **Ethics:** An understanding of professional, ethical, legal, security and social issues and responsibilities
9. **Individual and team work:** An ability to function effectively individually and on teams, including diverse and multidisciplinary, to accomplish a common goal
10. **Communication:** An ability to communicate effectively with a range of audiences
11. **Project management and finance:** An understanding of engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects
12. **Life-long learning:** Recognition of the need for and an ability to engage in continuing professional development

**3. List of cos(Action verbs as per Bloom's Taxonomy)**

CO1- explain the characteristics of distributed systems and the salient architectural features

CO2- Specify algorithms for determining global state, electing a coordinator for a group of communicating processes and implementing mutual exclusion in a Distributed System

CO3- Write the external data representation, client server and group communication

CO4- explain the File Service Architecture, sun network, Andrew File System

CO5- Describe how to name, locate and remove references to entities in a Distributed System, client centric and data centric consistency models and describe protocols for implementing consistency models and updating replicas in a Distributed System.

CO6- explains the concurrency control and distributed deadlocks in distributed transactions.

**4. Syllabus**

**UNIT-I**

**objective**

The main objective of this unit is to describe important characteristics of distributed systems and the salient architectural features

**SYLLABUS**

Characterization of distributed systems: introduction, examples of distributed systems, resources sharing and the web, challenges. System models: Introduction, architectural models, fundamental models.

**UNIT – II**

**objective**

The main objective of this unit is Specify algorithms for determining global state, electing a coordinator for a group of communicating processes and implementing mutual exclusion in a Distributed System

**SYLLABUS**

Time and global states: Introduction, clocks events and process states, synchronizing physical clocks, logical time and logical clocks, global states, distributed debugging.

Coordination and agreement: introduction, distributed manual exclusion, elections, multicast communication, consensus and related problems.

**UNIT -III**

**objective**

The main objective of this unit is to cover the Internet protocols, external data representation, gathering data and transforming it into a standard format before it is transmitted over a network, client server communication and group communication.

**SYLLABUS**

Inter process communication: Introduction the API for the Internet Protocols, External Data Representation and Marshalling, Client-Server Communication, Group Communication, Case Study: IPC in UNIX

**UNIT - IV**

**objective**

The main objective of this unit is to cover the distributed file systems, describe how to name, locate and remove references to entities in a Distributed System, client centric and data centric consistency models and describe protocols for implementing consistency models and updating replicas in a Distributed System.

**SYLLABUS**

Distributed File Systems: Introduction, File Service Architecture, Case Study

1: Sun Network File System, Case Study 2: The Andrew File System.

Name Services: Introduction, Name Services and the Domain Name System, Directory Services, Case Study of the Global Name Services.

Distributed Shared Memory: Introduction, Design and Implementation Issues, Sequential Consistency and IVY case study, Release Consistency, Munin Case Study: Other consistency Models

**UNIT** – **V**

**objective**

The Main Objective of this unit is to cover the transactions and concurrency control, distributed transactions.

**SYLLABUS**

Transactions and Concurrency control: Introduction, Transactions, Nested Transactions, Locks Optimistic Concurrency Control, Time Stamp Ordering, and Comparison of Methods for Concurrency Control.

Distributed Transactions: Introduction, Flat and Nested Distributed Transactions, Atomic Commit Protocols, Concurrency control in Distributed Transactions, Distributed Deadlocks, and Transaction Recovery.

**5. Session Plan/Lesson Plan**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S.NO** | **Topic (JNTU syllabus)** | **Sub-Topic** | **NO. OF LECTURES REQUIRED** | **Suggested Books** | **Remarks** |
|  |  | **UNIT - I** |  |  |  |
| **1** | **Characterization of distributed systems, System models** | Characterization of distributed systems: introduction | **L1** | **T1,R1** |  |
| **2** | examples of distributed systems | **L2** | **T1,R1** |  |
| **3** | Resources sharing and the web. | **L3,l4** | **T1,R1** |  |
| **4** | Challenges | **L5** | **T1,R1** |  |
| **5** | System models: Introduction | **L6** | **T1,R1** |  |
| **7** | architectural models | **L7,L8** | **T1,R1** |  |
| **8** | fundamental models | **L9,L10** | **T1,R1** | **I UNIT COMPLETED** |
|  |  | **UNIT - II** |  |  |  |
| **9** | **Time and global states, Coordination and agreement** | Time and global states: introduction | **L11** | **T1,R1** |  |
| **10** | clocks events and process states | **L12** | **T1,R1** |  |
| **11** | synchronizing physical clocks | **L13** | **T1,R1** |  |
| **12** | logical time and logical clocks | **L14** | **T1,R1** |  |
| **13** | global states | **L15** | **T1,R1** |  |
| **14** | distributed debugging | **L16** | **T1,R1** |  |
| **15** | Coordination and agreement: introduction | **L17** | **T1,R1** |  |
| **16** | distributed manual exclusion | **L18** | **T1,R1** |  |
| **17** | elections, multicast communication | **L19,L20** | **T1,R1** |  |
| **18** | consensus and related problems | **L21,L22** | **T1,R1** | **II UNIT COMPLETED** |
|  |  | **UNIT -III** |  |  |  |
| **19** | **Inter process communication** | **Inter process communication:** Introduction the API for the Internet Protocols | **L23** | **T1,R1** |  |
| **20** | External Data Representation and Marshalling | **L24,L25** | **T1,R1** |  |
| **21** | Client-Server Communication | **L26** | **T1,R1** |  |
| **22** | Group Communication | **L27,28** | **T1,R1** |  |
| **23** | Case Study: IPC in UNIX | **L29,L30** | **T1,R1** | **III UNIT COMPLETED** |
|  |  | **UNIT -IV** |  |  |  |
| **24** | **Distributed File Systems, Name Services, Distributed Shared Memory** | Distributed File Systems :Introduction | **L31** | **T1,R1** |  |
| **25** | File Service Architecture, Case Study | **L32,L33** | **T1,R1** |  |
| **26** | Sun Network File System, Case Study | **L34,L35** | **T1,R1** |  |
| **27** | The Andrew File System | **L36,L37** | **T1,R1** |  |
| **28** | Name Services: Introduction | **L38** | **T1,R1** |  |
| **29** | Name Services and the Domain Name System | **L39** | **T1,R1** |  |
| **30** | Directory Services | **L40** | **T1,R1** |  |
| **31** | Case Study of the Global Name Services | **L41,L42** | **T1,R1** |  |
| **32** | Distributed Shared Memory: Introduction | **L43** | **T1,R1** |  |
| **33** | Design and Implementation Issues | **L44** | **T1,R1** |  |
| **34** | Sequential Consistency and IVY case study | **L45,L46** | **T1,R1** |  |
| **35** | Release Consistency | **L47** | **T1,R1** |  |
| **36** | Minin Case Study: Other consistency Models | **L48,L49** | **T1,R1** | **IV UNIT COMPLETED** |
|  |  | **UNIT –V** |  |  |  |
| **37** | **Transactions and Concurrency control, Distributed Transactions** | Transactions and Concurrency control: Introduction | **L50** | **T1,R1** |  |
| **38** | Transactions, Nested Transactions | **L51** | **T1,R1** |  |
| **39** | Locks Optimistic Concurrency Control | **L52** | **T1,R1** |  |
| **40** | Time Stamp Ordering | **L53** | **T1,R1** |  |
| **41** | Comparison of Methods for Concurrency Control | **L54** | **T1,R1** |  |
| **42** | Distributed Transactions: Introduction | **L55** | **T1,R1** |  |
| **43** | Flat and Nested Distributed Transactions | **L56** | **T1,R1** |  |
| **44** | Atomic Commit Protocols | **L57** | **T1,R1** |  |
| **45** | Concurrency control in Distributed Transactions | **L58** | **T1,R1** |  |
| **46** | Distributed Deadlocks | **L59** | **T1,R1** |  |
| **47** | Transaction Recovery | **L60** | **T1,R1** | **V UNIT COMPLETED** |

1. **Session execution log**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S no** | **Unit** | **Scheduled completed date** | **Completed date** | **Remarks** |
| **1** | **I** | **12-12-2016** | **28-12-2016** |  |
| **2** | **II** | **12-1-2017** | **21/2/2017** |  |
| **3** | **III** | **22-2-2017** | **14/03/2017** |  |
| **4** | **IV** | **15-3-2017** | **4/4/2017** |  |
| **5** | **V** | **5-4-2017** | **20/4/2017** |  |

1. **Lecture Notes**
2. **Assignment Questions along with sample Assignments Scripts**
3. **Mid exam Question Papers along with sample Answers Scripts**

** SET-1**

**CMR ENGINEERING COLLEGE**

**Kandlakoya (V), Medical Road, Hyderabad – 501401**

**Department of Computer Science and Engineering**

**---------------------------------------------------------------------------------------------------- Year: III. B.TECH, SEM-II MID - I**

**Subject: Distributed Systems Branch: CSE (A, B, C, D)**

**Answer Any Two Questions: Marks: 2X5=10M**

1. Briefly define following distributed Systems? **CO1**

a) Internet b) Intranet c) Mobile computing

2. Explain about following architectural models? **CO1**

a) Client-server Architecture b) Peer to peer architecture

3. a) Explain about following terms

i) Clock skew ii) clock drift iii) Coordinated universal time

b) Discuss cristian’s algorithm for synchronizing clocks details **CO2**

4. i) Define distributed mutual exclusion

ii) Explain about central server algorithm for mutual exclusion. **CO2**

**SET-2**

**CMR ENGINEERING COLLEGE**

**Kandlakoya (V), Medical Road, Hyderabad – 501401**

**Department of Computer Science and Engineering**

**---------------------------------------------------------------------------------------------------- Year: III. B.TECH, SEM-II MID - I**

**Subject: Distributed Systems Branch: CSE (A, B, C, D)**

**Answer Any Two Questions: Marks: 2X5=10M**

1. a) Define the following terms

i) HTML ii) URLs iii) HTTP

b) Explain the examples of Distributed Systems? **CO1**

2. Explain about interaction model and failure model details? **CO1**

3. Explain about the Network Time Protocol **CO2**

4. Expalin about Ring based Election algorithm. **CO2**

**SET-3**

**CMR ENGINEERING COLLEGE**

**Kandlakoya (V), Medical Road, Hyderabad – 501401**

**Department of Computer Science and Engineering**

**---------------------------------------------------------------------------------------------------- Year: III. B.TECH, SEM-II MID - I**

**Subject: Distributed Systems Branch: CSE (A, B, C, D)**

**Answer Any Two Questions: Marks: 2X5=10M**

1. a)Give Difference between internet and intranet?

b) Explain about World Wide Web? **CO1**

2. Discuss various Challenges of Distributed systems? **CO1**

3. Explain about Cristiana’s & Berkeley algorithm for synchronizing clocks **CO2**

4. Write about reliable and ordered multicast communication methods? **CO2**

1. **Scheme of Evaluation**
2. **Mapping of COs with POs and PSOs**
3. **Attainment of COs,POs and PSOs (Excel Sheet)**
4. **University Question Papers/ Question Bank**
5. **Power point presentations (PPTs)**

**Available in CD**

1. **Websites/URLs/ e- Resources**
2. cs-www.cs.yale.edu/homes/aspnes/classes/465/**notes**.pdf
3. [www.cis.upenn.edu/~lee/03cse380/lectures/ln19-ds-v3.4pp.pdf](http://www.cis.upenn.edu/~lee/03cse380/lectures/ln19-ds-v3.4pp.pdf)
4. <https://www.cl.cam.ac.uk/~rja14/Papers/SE-06.pdf>
5. [www.cloudbus.org/652/LectureSlides.html](http://www.cloudbus.org/652/LectureSlides.html)
6. [www.pk.org/417/**notes**/index.html](http://www.pk.org/417/notes/index.html)
7. https://www.cs.rutgers.edu/~pxk/rutgers/**notes**/content/01-intro.pdf